

Portland Harbor Superfund Site In-Situ Capping

Presentation to the
Portland Harbor Community Advisory Group
March 11, 2015
EPA Region 10

Presentation Objectives

- Introduce one of several technologies to be evaluated in site's feasibility study
- Provide overview of in-situ capping:
 - Key considerations, advantages and limitations
 - Maintenance and monitoring
 - Success Stories

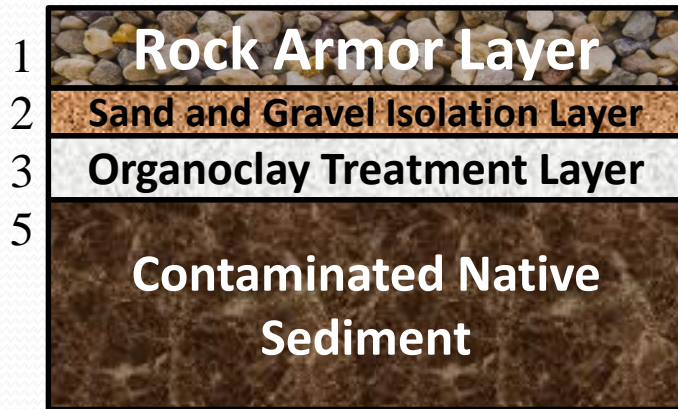
What Is In-Situ Capping?

- Placement of covering or cap of clean material over contaminated river bottom sediment that remains in place (in situ):
 - Typically constructed of clean sediment, sand or gravel
 - May include multiple layers of various capping materials

Capping Reduces Risk of Exposure

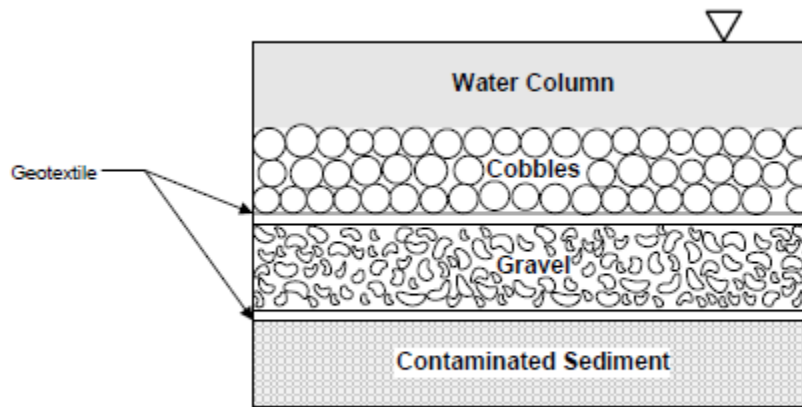
- A cap over contaminated sediment:
 - Creates physical barrier
 - Reduces exposure due to direct contact
 - Reduces ability of burrowing organisms to move contaminants to surface of river bottom
 - Stabilizes contaminated sediment
 - Provides erosion protection of sediment and cap
 - Reduces re-suspension of contaminants into the water
 - Reduces transport of dissolved contaminants into the water

Examples of Caps

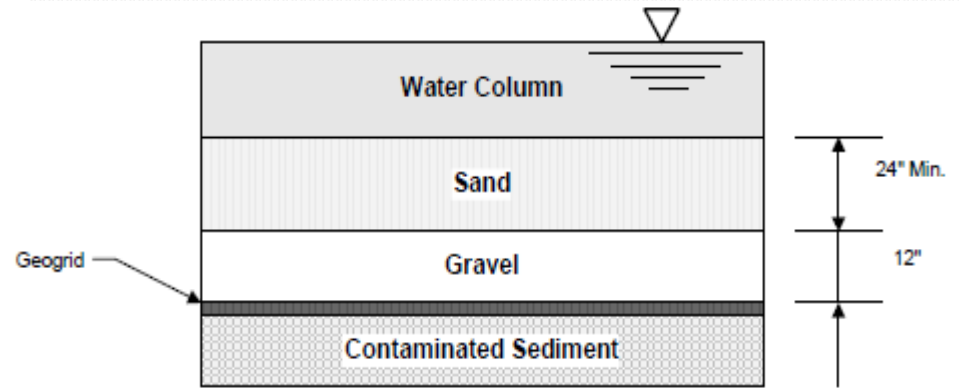


1. Rock layer to protect cap from erosion
2. Sand/gravel to isolate contaminated sediment
3. Treatment layer to contain or remove a specific contaminant
 - For example – oil absorption layer
4. Native soft sediment stabilized
 - For example – solidified with cement-like material
5. Contaminated sediment (untreated) under cap

Use of Geotextiles and Geogrids



B. Sheboygan, WI



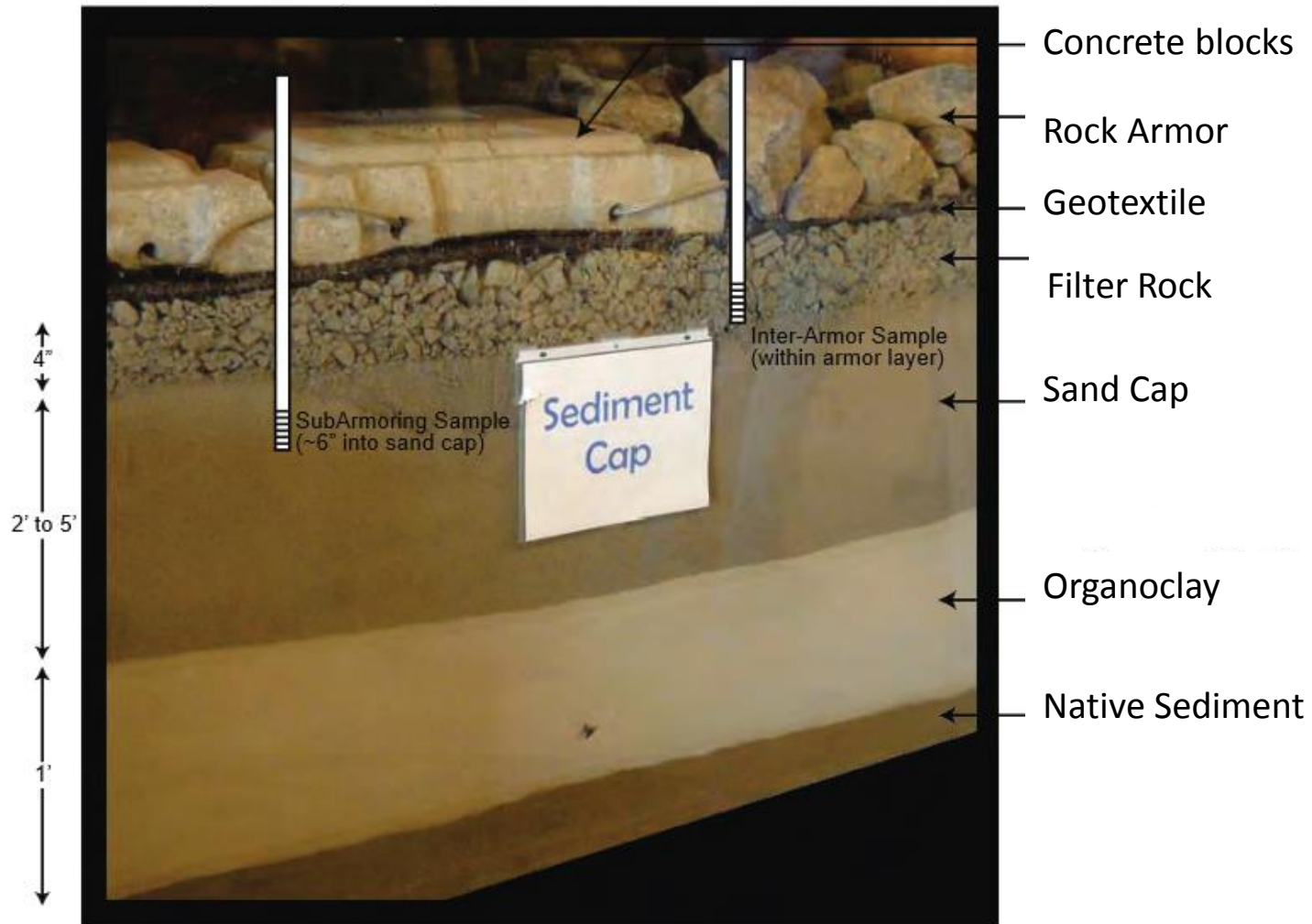
C. Convair Lagoon, CA

Source: Contaminated Sediment Remediation
Guidance for Hazardous Waste Sites. 2005.

Geotextile: synthetic fabric to separate contaminated soil or sediment from the cap or to separate or protect different cap layers

Geogrid: rigid synthetic material used to reinforce sediment

Cap Example



Capping Selection Considerations

1. Is suitable cap material readily available?
2. How will a cap affect use of capped area?
 - Infrastructure
 - Water depth
 - Human activities and potential use restrictions
3. Are site conditions favorable to capping?
 - Floods and ice scour
 - Ground water flow rate
 - Sediment strength
 - Movement of contaminants
 - Coverage area

Advantages and Limitations

Advantages

- Can quickly reduce exposure to contaminants
- Less infrastructure than dredging
- May be less disruptive to community
- May be less expensive
- May create improved river bottom surface habitat for native organisms

Limitations

- Contaminated sediment remains in place
- Cap must be maintained
- Long-term institutional controls may be required
- May alter habitat for native organisms
 - Materials that discourage burrowing organisms may be needed

Maintenance and Monitoring

- Caps must be maintained and monitored
- Inspections may check that:
 - Cap thickness remains protective
 - Contaminants remain effectively isolated
 - Cap continues to support expected habitat

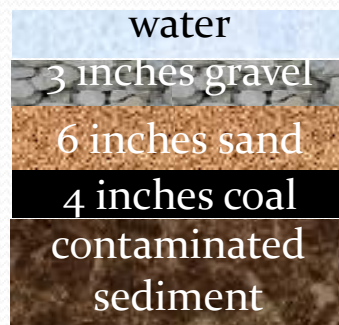
Capping Performance Monitoring

Wyckoff Superfund Site Diver Cap Sampling

[Video: Performance Assessment of the Wyckoff Superfund Site Cleanup Cap \(1:24 Minutes, 54.2MB, Windows Media Format\)](#)

Capping Success Story – PCBs

- Spokane River Upriver Dam PCBs Sediment site (Spokane, Washington)
 - 3.5 acres
 - Sediment concentrations as high as 1,430 parts per billion
 - Washington State Department of Ecology issued a no fish consumption advisory
 - 2006 – amended cap applied



- 2008 – total PCBs below detection in sand and coal layers; cap is working



Cap Placement

Source: Washington State Department of Ecology
<https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=4213>

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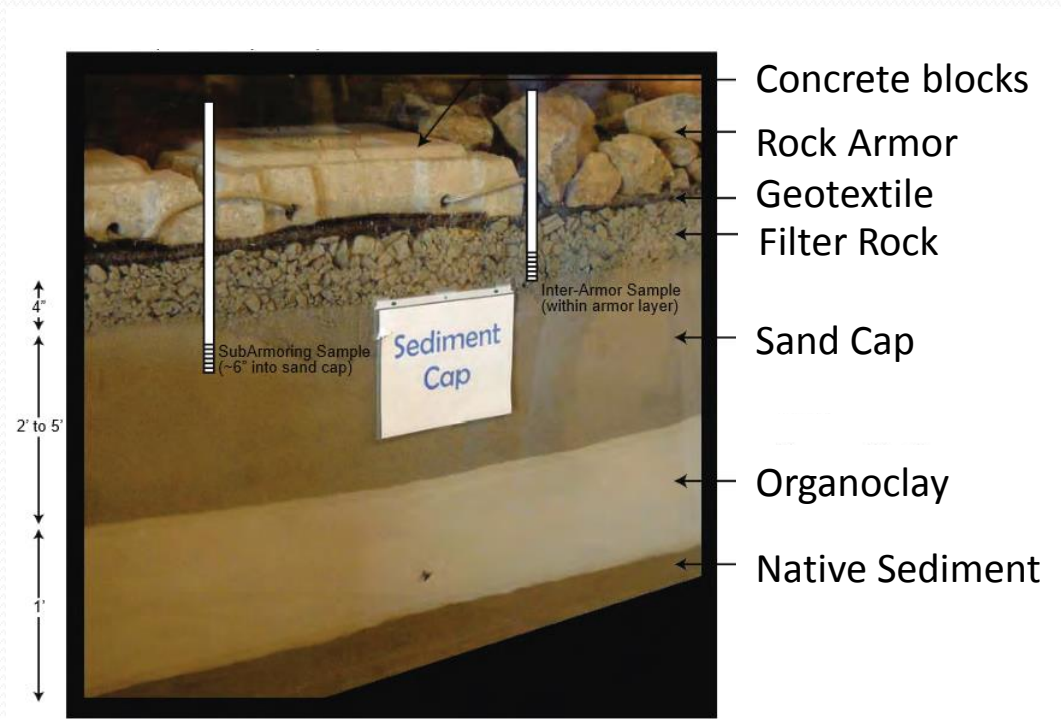
- Manistique River Area of Concern, next to Lake Michigan (Schoolcraft County, Michigan)
 - 15 acres (1.7-square-mile area of the Manistique River and Harbor)
 - 1996 to 2000 – EPA dredging
 - Capped with 40-mil (0.1-inch) plastic anchored by 38 two-ton concrete blocks around cap perimeter
 - Concrete blocks prevent erosion of contaminated sediments
 - 2001 – inspection confirmed cap was physically intact and most anchors in place.
 - 2001 – 10-ppm PCB concentration goal met
 - 2004 – 1 ppm PCBs remaining in river and harbor sediments



Source: EPA. <http://www.epa.gov/glnpo/glinicators/sediments/remediateb.html>

Capping Success Story – PAHs

- McCormick & Baxter site (Willamette River, Portland, Oregon)
- 23-acre area
 - Sediment contaminated with PAHs, creosote, diesel, pentachlorophenol and heavy metals
 - Risk from direct contact with sediments
 - 2005 – amended cap applied
 - 2010 – PAHs in cap below National Recommended Water Quality Criteria, with exception of chrysene in one sample



Typical Sediment Cap Section

Source: Third Five-Year Report

http://www.epa.gov/region10/pdf/sites/mccormick_baxter/m&b_five_year_review_sept_2011.pdf

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<http://www.epa.gov/region10/portlandharbor>

Portland Harbor Superfund Site

